DOCUMENT RESUME

ED 195 790 CE 027 473

AUTHOR McNeil, John D.; Morimoto, Takiko
TITLE Competency Based Reading Skills and the Reading Demands of Minority-Bilingual Auto Mechanics.
INSTITUTION California Univ., Los Angeles.
PUB DATE Sep 80
NOTE 24p.

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Adult Education; *Auto Mechanics; *Functional Reading; Graduation Requirements; High School Graduates; *Job Skills; *Minimum Competencies; Minimum Competency Testing; *Minority Groups; *Reading Skills
IDENTIFIERS *Bilinguals

ABSTRACT

A study of the relation between the reading competencies for high school graduation and the reading demands of auto mechanics began with determining job reading tasks of auto mechanics. Fifty auto mechanics, the majority of them bilinguals, were interviewed. From this data about the kinds of information mechanics get from reading and with copies of the printed materials themselves, job reading tasks were constructed. These tasks included reading of indexes, specifications, codes, directions, and functional descriptions. A range of items measuring competency-based reading skills and job reading tasks were administered to forty-nine students in three high schools. Eighteen were bilingual minority and thirty-eight were enrolled in auto shop courses. Data suggested that many of the competency-based skills were associated with the job reading tasks of auto mechanics. Successful achievement on competency exams was associated with ability to read job tasks. Minority bilingual auto mechanics in both lower and higher paying jobs were tested using the job reading tasks and items from high school graduation competency tests. Nearly 38 percent of the variance in on-the-job reading was accounted for by the competency-based reading skills required for high school graduation. These basic skills were more relevant to higher than to lower paying jobs, with limited English mechanics being denied higher paying employment. (YLB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED195790

Competency Based Reading Skills and the Reading Demands of Minority-Bilingual Auto Mechanics

John D. McNeil

Takiko Morimoto

UCLA

September 1980

CE027473

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

John D. McNeil

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Competency Based Reading Skills and the Reading Demands of Minority-Bilingual Auto Mechanics

Summary

Job reading tasks of auto mechanics were determined through interviews and observations. These tasks included the reading of indexes, specifications, codes, directions, and functional descriptions. Subsequently, minority auto mechanics were asked to perform these job reading tasks and to respond to items taken from high school graduation competency tests.

Nearly 38% of the variance in on the job reading was accounted for by the competency based reading skills. These basic skills were more relevant to higher paying jobs than to lower paying jobs. The relation of reading to income is confounded by employment tests. Mechanics with limited English are denied higher paying employment because they can't pass written exams. This is so although passing such exams is no warrant that one is a good mechanic.

Mechanics with limited English cope with reading job tasks by circumvention, asking fellow workers to translate, relying on pictures, and using materials written in their native language. On one hand the complexity of cars seems to portend higher literacy demands. However, the trend to specialization, the use of videodiscs for teaching diagnostic procedures, and the practice of substituting rather than repairing units is likely to minimize the need for reading.

X1JDM/G

Competency Based Reading Skills and the Reading Demands of Minority-Bilingual Auto Mechanics

Our study of the relation between the reading competencies for high school graduation and the reading demands of auto mechanics followed this sequence of events:

1) Determining the job reading tasks of minority auto mechanics at entry and advanced levels.
2) Administering both a range of items measuring competency-based reading skills and job reading tasks to minority high school students enrolled in auto shop courses. This testing was for the purpose of determining the difficulty, discrimination, and association of items and tasks.
3) Administering selected competency-based test items and job reading tasks to minority-bilingual auto mechanics in low and high paying positions.

Determining Job Reading Tasks

Interview Schedule

Fifty auto mechanics, the majority of whom were bilinguals, were interviewed at their work sites in order to obtain information regarding the reading demands of their jobs. The following format was used in conducting the interview:

Company name _____, Number of employees _____,

Experience of the mechanic _____ years,

Full or part time worker.

1) What have you read on your job? Today? Yesterday? This week?

2) How often do you read it? Daily? Weekly? Monthly?

3) Show me what you have read.

4) What information were you looking for?

5) What is your most crucial reading task?

Supervisors of the mechanics were also interviewed and asked these questions:

1) What do your auto mechanics have to read on the job? What type of reading do they do?

2) How often do they need to read manuals, catalogs, service notices, etc.?

3) Which of the things you mentioned do you think are more important? Would you rank, in order of importance, those types of reading that you have mentioned?

A number of all day observations were subsequently made in selected shops to verify that what mechanics and their supervisors said was read was what mechanics actually read on the job. Further, non-obtrusive measures, such as smudge marks on particular sections of repair manuals confirmed the frequency with which certain information was sought.

Work Sites

All interviews were conducted in the Los Angeles metropolitan area. The work sites were diverse in terms of size and function. Some shops operated on the basis of specialization. That is, the shop itself offered repair of a specialized nature--brakes, carburetors, or a particular make of car Specialization was also found in some general service shops where different mechanics were assigned duties to work on different parts of the car, not making general repairs. Other shops,

characterized as general service departments, offered both a wide range of repairs and expected mechanics to be able to make any of these repairs.

The reading demands were much higher in the general service shops and in those shops where the mechanic had a range of responsibilities instead of only a speciality to perform within the automotive field.

Time Spent in Reading

Consistent with previous studies, it was not uncommon to find mechanics in speciality shops spending less than one hour a week in on-the-job reading.[1] Mechanics in low paying positions where they were making routine repairs in a narrow speciality reported little or no time spent in reading on the job. Usually such mechanics only had to read repair order forms or selected pages of an automotive repair manual, parts lists, or a table of specifications for the speciality. However, mechanics in general shops and with a range of duties sometimes reported as much as ten hours a week reading job related material. If they were in a supervising position, for example, they were required to read shop manuals, schematics, complex diagrams, dealers catalogs, price lists, forms, letters, memos and service bulletins advising of necessary changes in particular equipment.

The reading material commonly found in all garages was the auto repair manual. The most widely used of these manuals are those published by the Chilton Book Company and Mitchell's Manuals, Inc. These manuals provide information concerning the repair of many cars and trucks covering models from various years. Service garages that specialize in one

---

[1]Moe, Alden J. etal. The Literacy Requirements of an Automotive Mechanic on the Job and in a Vocational Training Program. Department of Education Purdue University, 1980

make of car and truck--particularly those of foreign origin--have manuals written especially for the vehicles for which they are responsible.

Description of Automotive Manuals

Sticht has suggested a classification scheme for categorizing the content of job material.[2] Content analysis of the most widely used manuals showed that they included information within each of the following six categories:

(1) Tables of Content and Indexes--content designating the location of information within the publication.

2) Standards and Specifications--content setting forth tolerances to which task procedures or the completed product must conform.

3) Identification and Physical Description--content symbolically representing an object by an identifying code (stock number, nomenclature) and itemizing its distinguishing attributes.

4) Procedural Directions--content presenting a step-by-step description of how to carry out a specific job activity. Essential elements are equipment, materials and how they are to be used with presentation organized in a sequential fashion.

5) Procedural Checkpoints--content presenting a key word or highly summarized version of what should be done rather than how it should be done. The mechanic is assumed to know how to carry out the steps once reminded by the check points.

6) Functional Description--content presenting an operating (cause and effect, dependency relationships) descriptive of some physical system or subsystem.

Readability estimates of these materials according to the Dale-Chall Formula, the Fry Readability Graph, and the Forcast Readability Formula showed ranges in difficulty from tenth through twelfth grade levels with an average of eleventh grade. It should be clear however that the readability formulas are not very useful in assessing reading difficulty

---

[2]Sticht, T.G. (Ed), Reading for Working: A Functional Literary Anthology. Human Resources Research Organization, Alexandria, Virginia, 1975.

of the most widely used sections of the manuals-tables of specifications, indexes, and pnysical descriptions. Further, the information sought by mechanics demands mostly literal comprehension, some interpretation (especially of charts and diagrams) and little evaluation. Interpretation of complex schematics and wiring diagrams was required of only advanced auto mechanics. Due to the technical nature of the material, mechanics who are familiar with the special vocabularly and work activity gain information from the manauals even if they cannot read at the assessed difficulty level. We found mechanics who could not read English, but who could obtain the information they frequently wanted from the materials.

Style features of the automotive publications include the use of diagrams, charts, and illustrations which may be used with or without accompanying written explanation. A technical writing style predominates. Sentence and paragraph structures emphasize the following of directions and interpreting graphs and diagrams. The use of pictorial elements eliminates the need for most modifiers. Articles and sometimes other function words are omitted; hence the style is telegraphic:

> "Remove torsion bar installer and remover and stall on other end of torsion bar crossmember and repeat step 2. Remove tool".

Directions for assembly and disassembly begin with action verbs indicating what must be done. The sentence elements in automotive manuals consist of subject, verb, object, predicate object and indirect object. The subject is implicit; the object is a specific part or tool to which the actien is directed.

Two combinations of person and mode are found: Second person imperative for instruction and third person indicative for description.

Cautions are also written in the third person, giving information about a condition which must exist prior to and during the performance of a task.

Most data in technical manuals are presented as graphs, charts, tolerance tables, parts and tool lists. Two commonly used charts are flow charts and tables. Flow charts are schematic representations showing flow of a process and sequencing of individual or simulataneous activity. Tolerance tables provide information concerning the continued serviceability of a part. A listing of the part is given along with minimum and maximum specifications. The use of a parts list requires familiarity with the parts name or visual concept of the part itself. In most cases, the manual provides an exploded view of the part and the part's name. Using this view, limited English speakers can find the parts number necessary for ordering a replacement.

It is important to note that auto mechanics read in order to do rather than to learn. Reading to do involves searching for and locating information to perform a certain job. In contrast, reading to learn requires learning from text and remembering what has been read for some future use. While an occasional mechanic spoke of taking a manual home in order to learn, most of them stated that they merely looked up information needed to immediately perform a task, either by looking for a specification that applied to the work being done or for a direction to be followed. Most of the job reading tasks were repetitive; performed daily, weekly and monthly. In nearly all instances, the mechanic knows what information he needs and already has the knowledge required for retrieving the information.

The types of information most commonly sought by all mechanics are specifications, parts data, and procedures for carrying out a task. It is true, however, that the manual takes on more importance as model changes occur. For example, newer regulations such as those concerning emissions and exhaust systems have increased reading for functional descriptions.

Job Reading Tasks

From the data about the kinds of information mechanics get from reading and with copies of the printed material itself, job reading tasks were constructed. These tasks represented both the most frequently mentioned reading tasks and the kinds of information (content) found in the materials. Although far more difficult questions could be posed as tests of job reading ability, we wanted tests that would be suitable for the widest number of work situations and those of different levels of experience. We also wanted items that were passage dependent. Our interviews had shown that with respect to information such as procedural directions and functional descriptions, many mechanics answered the questions, not in accordance with the text, but from their own experiential background.

The following seven items are the job reading tasks:

12

The following picture show the parts of Rear Bumper of Toyota Corolla. Read the parts list carefully, and answer the questions.

Q1.

What is the name of the part shown in figure 8?

_____

Q2.

What is the part number for this part?

_____

11

Question: What is the tolerance or range allowable for Toe-In in the wheel alignment of a Vega?

_____

10

Question: On what page would you find information for aligning a propeller shaft for a 1971 Oldsmobile?

_____

9

Question: According to the order, what weight oil should be used in changing oil?

_____

Read the following paragraphs, and answer the questions.

1979 Ford and Mercury station wagons may develop a condition where the fuel gauge always registers full, even when empty. This problem is caused by the left rear seat belt anchor grounding the fuel gauge wire. To repair, proceed as follows:

Remove lower cushion from rear seat. Inspect seat belt anchor for trapped fuel gauge wire. Loosen seat belt anchor bolt and free trapped wire. Tighten seat belt anchor bolt to 32 ft. lbs.

Fix damaged wire and tape it to the floor pan away from the seat belt anchor. Replace rear seat cushion. Check gauge operation. If gauge fails to register accurately, make further test of fuel gauge.

Question: What would you do if the fuel gauge still registers inaccurately after checking the gauge wire?

1) Remove lower cushion from rear seat.

2) Tighten seat belt anchor bolt to more than 32 ft. lbs.

3) Make further test of fuel gauge.

14

Question: Find distributor TVS valve and the line marked D. Trace this vaccuum line to the next unit. What is the next unit?

1) Throttle body

2) Dist. vac. adv. sol.

3) Air pump div. valve

15

Read the following paragraphs, and answer the question.

Some 1979 Chrysler Newport, New Yorker and Dodge St. Regis models may experience low oil pressure indications, Chrysler Corp. points out that this may not be caused by a malfunction in the engine oiling system.

Low oil pressure conditions must first be verified by performing standard oil pressure test procedures. If oil pressure reading is found to meet actual normal specifications, then problem may lie in the oil pressure sending unit.

Should this type of situation be encountered, replace the oil pressure sending unit with a revised replacement unit (No. 2427237)

Question: According to the article, what malfunction may cause a Dodge St. Regis, '79 to show low oil pressure?

1. Malfunction in the engine oiling system.

2. Malfuntion in the oil pressure sending unit.

3. Malfunction in the test instrument of oil pressure

Task 1 represents the kind of reading most commonly performed by beginners and low paid mechanics. It is a job work order indicating what must be done. As a content type category, it is classified as procedural check point.

Task 2 is representative of tables, content and indexes designating the location of information within a publication. It measures whether or not the mechanic can find information in table.

Task 3 represents a task that calls for reading standards and specifications-the ability to obtain the tolerance which must be met.

Task 4 measures the mechanic's ability to engage in the frequent task of using a parts list. It is classified as an instance of identification and physical description.

Task 5 is a measure of the ability to read procedural directions. It calls for accurate reading of specific steps to be carried out.

Task 6 is a measure of ability to read a simple diagram; a description of a functional unit.

Task 7 is best classified as a functional description task. It indicates an operating cause and effect relationship.

Competency Tests and Job Reading Tasks

Competency Tests

Two types of tests are being used to measure minimal competency in reading: (1) tests that measure school skills traditionally taught in reading comprehension-finding the main idea of a passage and drawing inferences from text. The reading material to which school skills are to be applied is expository and literary-similar to the passages found in classroom textbooks. (2) tests that measure "real life skills"

designed to indicate whether one can read the tasks thought to be essential for adult participation in society.[3] Examples are measuring the ability to read safety warnings, forms and applications and common reference sources.

As part of our strategy for determining the relation between competency based tests and job reading tasks, we administered the previously mentioned job reading tasks to 49 students in three high schools. Of these students 18 were bilingual minority and 38 were enrolled in auto shop courses. These same students had just taken a comprehensive competency based reading test that included both traditional school skills and life skills. There was, for example, the traditional tests of (a) finding the main idea and supporting details in content such as articles, newspapers and books of a general nature, (b) finding information by consulting common reference tools maps, graphs, tables and directions, and (c) finding information by consulting a dictionary and book's table of content and index.

Tests of life skills included tests of (a) comprehending warnings stipulated in content such as medicinal and household product safety warnings, (b) comprehending what is required in order to fill out application forms, (c) comprehending requirements set forth in governmental publications-driver's handbooks, voter registration and rental agreements, and (d) comprehending procedures specified in operating manuals for machines and appliances, assembly instructions for household articles and cookbooks.

These tests were scored on a pass-non pass bases.

---

[3]Airasian, P.W. et al. Minimal Competency Testing. Educational Technology Publications, Englewood Cliffs, New Jersey, 1979.

Performance on Competency Based and Job Reading Tasks

Results of performance on both the competency tests and the job reading tasks are indicated in Table 1, showing the number of successful and unsuccessful students on both types of tests. Successful performance on the job reading tasks was indicated by correctly responding to each of the seven items.

Table 1:
Performance of Students on Job Reading Tasks and Competency Tests

	Students Passing Job Reading Tasks	Students Failing Job Reading Tasks
Students Passing Competency Exam N = 27	22	5
Students Failing Competency Exam N = 11	1	10

Students who fail the competency exam have difficulty in reading job related material in some categories of content. Those who could not pass the compentency test were unlikely to be able (a) to interpret a simple diagram (45% could do this task), (b) to determine cause and effect from a functional description (only 9% could do this task). However, most students who failed the competency tests were able to read the following job tasks:

1) identify a part using (a) a parts description (89% could do this), (b) a parts number (82% could do this)

2) obtain a specification using a table (100% could do this).

3) Follow directions in reading step by step procedures (92%)

4) Interpret a work order (64%)

Those who passed the competency test could perform nearly all of the job reading tasks. They could for instance read even the most difficult

items-interpreting a diagram and determining cause and effect from a functional diagram (84% and 81% successful responses respectively).

These data suggest that many of the competency based skills are associated with the job reading tasks of auto mechanics-the use of an index, the deriving of specifications from a table, the interpretation of a parts list, and the following of step by step procedures.

Students who are able to derive main ideas from articles, guides and general interest books are also able to perform well on the more difficult job reading tasks-determining cause and effect relationships.

Thus far our findings indicated that successful achievement on competency exams was associated with ability to read job tasks. However, we did not know whether mechanics who could read job tasks could also perform well on competency tests. School instruction in traditional skills, for example, might better prepare students for reading on the job (transfer) than job experience in learning to read specific materials prepares one to read other types of materials. Whether those mechanics who learned to read on the job for their special needs would also be able to read the real life and traditional school material remained to be seen. To the end, five tests were selected to be administered to minority mechanics at their work sites. Three of these tests were job reading tasks--interpreting a diagram, reading a work order, and finding a cause and effect relationship from a functional description. Two of

the tests were competency tests--one measuring the real life skill of understanding written safety warnings and the other a traditional skill of determining a main idea from a passage.

Sample

Our sample of sites from which minority-bilingual mechanics were to be chosen was of two kinds: large shops employing one hundred or more auto mechanics and small shops with five or fewer mechanics. The small shops were randomly chosen from locations found in the yellow pages of the telephone directory listing automobile repair and service in the east Los Angeles area--an area known to have predominantly minority bilingual mechanics. The large shops were selected because of the number of mechanics employed--the maintenance shops of the county of Los Anglees, the Yellow Cab Co., Rapid Transit District, Santa Monica and Los Angeles City School Districts, the U.S. Post Office, Sears Roebuck Co., Hertz Rental Service, and Midas Repair Shops. These shops represented a range in public and private agencies.

The mechanics in both large and small shops were minority-bilingual persons. Forty-six of these persons were working in lower paying jobs and thirty-four in higher paying jobs (a lower paying job was one below the medium pay $17,000 annually, a higher paying job was one paying above the medium). Of those in small shops, 88% were in the lower income category, while only 5% of those in large shop were in this category.

Procedures

Employers were advised of the nature of the study and were requested to allow their minority-bilingual mechanics to be interviewed. The

mechanics were interrupted at their work and asked if they would be willing to read and respond to reading tasks for the purpose of determining the relevancy of these tasks to their own work.

The tests were completed during a single visit. Data regarding years experience as an automobile mechanic and approximate income were also collected.

Results

The correlation between scores earned on the competency based tests and the job reading tasks was .62. Approximately 38% of the variance on the job reading tasks can be accounted for by competency based test. As indicated in Table 2, performance on the competency test (3 items) but not on the job reading tasks (3 items) was better in large shops.

Table 2:
Performance on Job Reading Tasks and Reading Competency Test by Size of Shop

	Mean Score of Job Reading Tests	Mean Score of Reading Competency Tests
Small Shop (N = 40)	1.80 (SD = 1.70)	1.18 (SD = 1.25)
Large Shop (N = 40)	2.08 (SD = 1.05)	1.98 (SD = 1.17)
	NS	$p < .01$

Nearly 50% of the mechanics in small shops read the functional tasks correctly but only 22% were able to read the traditional task of finding a main idea in a passage. In the large shops 70% read the functional task correctly and 60% found the main idea in a passage.

Although there was no significant difference between workers in large and small shops on the overall reading of Job reading tasks, those in large shops were slightly better at interpreting work orders and determining cause and effect from functional descriptions.

Table 3 indicates that years experience as a mechanic correlates with ability to read competency tests. Mechanics in small shops averaged 12 years experience; those in large shops 13 years.

Table 3:
Mean Scores on Job Reading Tasks and Reading Competency Tests by Experience

	Job Reading Tasks	Reading Competency Tests
Less Experienced Mechanics (N = 50)	1.70 (SD = 1.14)	1.48 (SD = 1.26)
More Experienced Mechanics (N = 30)	2.40 (SD = .85)	1.67 (SD = 1.32)
	$p < .01$	NS

Income was associated with both the ability to read job reading tasks and competency tests (Table 4). The average income for mechanics in small shops was $12,000 per year; in large shops $17,000.

Only 15 percent of low income mechanics answered all parts of the competency test correctly, whereas 53% of high income did so. High income mechanics were equally successful on the functional--life skill--and the traditional--finding the main idea--components of the competency test (71% correct in each component); lower income mechanics were better in the functional component (39%) than the traditional component (20%).

Table 4:
Mean Scores on Job Reading Tasks and Reading Competency Tests by Income

	Job Reading Tasks	Reading Competency Tests
Low Income (N = 46)	1.48 (SD = 1.07)	.98 (SD = 1.22)
High Income (N = 34)	2.56 (SD = .79	2.56 (SD = .90)
	$p < .001$	p .001

Conclusions

Competency based examinations are related to the job reading tasks of automobile mechanics from Los Angeles area shops. Approximately 38% of the variance in on the job reading performance can be accounted for by the reading skills required for high school graduation. However, the basic skills measured by competency exams are more relevant to higher paying jobs than to low paying ones. Mechanics can hold low paying jobs without the reading competencies demanded by high school graduation.

Years experience is associated with ability to read job tasks but not with ability to pass reading competency tests. A job may provide opportunity to learn the limited reading skills associated with it. However, on the job reading does not contribute to general reading ability nor to the ability to read other job related materials.

High paid mechanics read both job tasks and competency tests better than lower paid mechanics. Lower paid mechanics do not read either the functional nor the traditional dimensions of competency tests very well.

Indeed, there is evidence that lower paid positions do not require such competencies. The relation of reading to income is confounded by employment tests. Higher paid mechanics were employed more frequently in public and quasi public agencies such as the maintenance shops of the county, the Rapid Transit District and the school systems. Lower paid employees were employed by private companies such as the Yellow Cab Company and by small independent garages. Mechanics with limited English cannot get jobs in the higher paying shops because they cannot pass the written examinations. This is so even if the passing of a written exam is no warrant that one is a good mechanic. Public agencies such as the U.S. Post Office have found it necessary to establish performance exams because so many poor mechanics were hired on the bases of the written exam. Similarly, we found highly rated mechanics who were denied promotion because they could not pass required written exams.

The materials read by highly paid mechanics differ from that read by lower paid mechanics in both number and kind. The lower paid mechanics usually read only repair order forms, tables of specifications, and parts lists. Higher paid mechanics read a variety of forms, service bulletins, diagrams, letters, many parts of the service manuals, and catalogs. Further, higher paid mechanics are more frequently required to read content characterized as functional descriptive. Although competency based exams include most of the prerequistes for reading in high paying jobs, there are some omissions: the reading of diagrams, the interpretation of instrument scales, the reading of decimal fractions and mixed fractions.

The technical vocabulary and relevant concepts essential for employment in higher paid positions may be better acquired in automotive

training programs or in apprentice opportunities than through instruction in reading. Individual experience with auto mechanics and familiarity with specialized information contribute to both the reading of job related material and performance as a mechanic. It should be clear that the present study related the skills measured in competency exams to job reading tasks, not to performance as mechanics. There are many non-reading mechanics who are viewed as excellent employees and who acquired their skill and knowledge through apprenticeships with master mechanics or through training in a foreign country.

Many mechanics with limited English cope with their job tasks by circumventing reading. They may ask fellow workers who are more fluent in both languages to translate when it is necessary to communicate with a supervisor or client. They also may rely on pictures in identifying parts and nomenclature. Frequently, they read diagrams, tables, charts and drawings by bringing their own language and experience to bear in gaining the information desired. A few auto parts companies such as Champion issue catalogs in Spanish and there is one publisher of a general repair manual, Leniel-Clewson, who has a manual written in several languages. Many of the employers and employees we interviewed want more materials written in Spanish.

Any conclusion drawn regarding reading and the automotive trade must take into account the range of job opportunities--general apprentices and journeymen who maintain and repair vehicles, locating engine trouble and making adjustment and replacements; speciality mechanics who may specialize in diagnosis and tune up, electrical repair, tranmission, front end and steering, and the like; supervisors who are usually expert

mechanics responsible for selecting and routing repair work, supervising and instructing other mechanics, and inspecting finished repairs.

Although vocational leaders recommend that specialization be undertaken only after successful experience as a journeyman mechanic, we found a trend in the opposite direction. Many beginning mechanics are now in a specialization. They occupy specialist positions knowing only the duties of the speciality. The reading demands of such specialities are minimal.

Concurrent with the trend to specialization and reduced reading requirements is the increased complexity of cars. New systems, such as automotive electronics applied to the ignition and braking systems and computerized engine controls are beyond the diagnostic ability of the average mechanic. Hence there appears to be a need for more highly trained and literate mechanics. However, it remains to be seen whether the industry will demand increased reading skills or whether other ways will be found for dealing with the complex systems. Diagnostic machines, videodiscs showing diagnostic and repair procedures, and substitution rather than repair of units may minimize the need for reading.

A final conclusion is that there are many minority-bilingual persons with very limited reading skills who work as auto mechanics; however, minority members in higher paying positions within the field have the reading competencies measured by competency exmainations. This correlation between reading competency and income is not necessarily a causal relationship since the larger employees commonly use a screening test as part of their hiring procedure.